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VISIT TO FERROX IRON OF CANADA, LTD., PRESCOTT, ONTARIO

by

J. L. Horwood

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On November 17, 1965, G. E. Alexander and J.L. Horwood of the Mineral Physics Section accompanied Mr. I.F. Wright on a visit to Ferrox Iron of Canada, Ltd. Other Mines Branch personnel present were Mr. H.M. Woodrooffe, and Mr. R.A. Wyman of the Mineral Processing Division. At the plant a conference was held in the office of Mr. P.D.R. Maltby, Plant Supervisor; also attending were Mr. John Nye and Mr. Edward Emmerich.

After a brief discussion of the preparation of a group of samples submitted for testing by the company through Mr. H. Lysons of DRB, there was a short discussion concerned with methods of testing - magnetic, X-ray, etc. - and problems of grinding. This was followed by a tour of those areas of the plant which were of particular interest.

(a) Milling

Mr. Nye stated that the magnetic properties of their samples milled in alcohol differed from those obtained from the same materials milled in

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water, and that this effect would require further investigation (a matter of possible interest in magnetic testing of samples from this source).

After milling, the material was quickly transferred to a polythene bag to be sealed against atmospheric effects. The protective bag was opened immediately prior to pressing and grain orientation. The moisture content of the sample when added to the press was relatively high, up to 25%.

(b) Grain Orientation by Means of Magnetic Field During Pressing

The apparatus consisted of a hydraulic press with four side rods, each 2 inches in diameter, and top and bottom plates approximately 1.5 inches thick to provide an easy magnetic return path for the field developed in the mould. The sleeve of the mould was made of stainless steel in order not to divert the magnetic field from passing through the rams and the material being pressed. (Sample dimensions on pressing were 2 inches in diameter and 0.5 inch thick, although these were reduced up to 25% by sintering and the thickness somewhat more when the faces were ground parallel with a diamond wheel). The top and bottom rams were of soft iron. Interposed between the rams and the sample (in order) were discs of felt, about 1/8th inch, and discs of filter paper to aid in removal of water from the sample (use of discs recommended by the Bell Telephone Laboratories). Pressure applied during pressing was very low, less than 1000 p.s.i.

A magnetic field was applied to the specimen by placing a coil of insulated, 3/16th inch, copper tubing over the stainless steel sleeve. The coil contained 80 turns; a current of 200 amperes was supplied from a

welder power supply. Only a very small volume of cooling water was required to pass through the tubing. Operating time was about 15 seconds, current directly "on" and "off", with a duty cycle somewhat less than 50%. The magnetic field applied to the specimen was estimated to be 500 oersteds,

(c) Grinding

After pressing and sintering, samples for magnetic testing were ground to produce parallel faces. In this procedure the sample was fastened in the chuck of a lathe (manufactured by Edelstaal, Toronto) and a diamond facing wheel driven by a high-speed air turbine was passed over each face of the sample in turn.

To make torroid cores an inner disc was removed from the sample by drilling (possibly the latter disc, if intact, could be retained for establishing the B - H loop).

(d) Magnetic Testing

A plot of the hysteresis loop provides the required information for determining the energy product, B x H, which is considered commercially to represent the figure of merit of a hard ferrite. To plot hysteresis loops a fluxmeter (O. S. Walker) and Bell gaussmeter were used with a vertical magnet with adjustable pole pieces and built-in sensing coils (made in Germany, sold by O. S. Walker, Worcester, Mass. U. S. A.).

For more accurate flux measurements during standardization a 60 x 40 x 10 mm NMR fluxprobe will possibly be acquired. Manufacturer: Butler Roberts Associates, 202 East 44th Street, New York 17, N. Y. , U. S. A.; cost: approximately $895 U. S.